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Docket No. 200314366-1

Remarks

This communication is responsive to the Final Office Action of **July 19, 2006**. Reexamination and reconsideration of **claims 6 and 34-38** is respectfully requested.

Summary of The Office Action

Claim 6 was rejected under 35 USC §103(a) as being unpatentable over Boyle et al. (Pub. No. US 2002/017089111) in view of Maggs et al. (US Pat. 3,867,217).

Claims 34-38 were rejected under 35 U.S.C. §103(a) as being unpatentable over Hall et al. (US 6,902,867) in view of Boyle et al. (US 2002/0170891) and further in view of Maggs et al. (US Pat. 3,867,217).

Claims 6 and 34-38 were rejected under 35 USC §103(a) as being unpatentable over Baughman et al. (US Pat. 5,608,436) in view of Boyle et al. (US 2002/0170891) and further in view of Maggs et al. (US Pat. 3,867,217).

The Present Claims Patentably Distinguish Over the References of Record

Independent claim 6

Claim 6 recites a fluid-handling slot formed by a first process and a second different process where the second different process removes additional substrate material from the substrate to form an upper terminus having a second profile different from a first profile and the second process also removes debris created by the first substrate removal process. Boyle, Baughman and Maggs fail to teach or suggest this feature and thus claim 6 patentably distinguishes over the references of record.

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The Boyle Reference

Boyle teaches laser machining to form a via. (Boyle, Abstract). Machining may be performed in multiple passes. (Boyle, Abstract). The Office Action relies upon Figures A-B and 1-2 of Boyle. Fig. A illustrates prior art accumulation of debris and molten material at a via outlet. (Boyle, paragraph 6). Typically, the debris cannot be removed by conventional washing techniques. (Boyle, paragraph 6).

Fig. B illustrates a three-step process in which a laser is used to machine a via structure with rough tapered walls. (Boyle, paragraph 12). The sidewalls are then cleaned in a second step. (Boyle, paragraph 12). Finally, an insulating layer is created on the internal via walls in the third step. (Boyle, paragraph 12). Thus, Boyle does not teach or suggest a second different process that removes additional substrate material from the substrate to form an upper terminus having a second profile different from a first profile and the second process also removes debris created by the first substrate removal process.

The Maggs Reference

Maggs does not cure the shortcomings of Boyle. Maggs teaches a technique for forming thin-film circuits by laser machining in which a gold conductor layer is first covered with a copper protective layer. (Maggs, Abstract). After machining, the laser-machined gaps are cleaned by a fluid stream containing abrasive particles, during which the protective layer shields the gold conductors. (Maggs, Abstract emphasis added). Thereafter, the protective layer is removed by selective etching. (Maggs, Abstract). Significantly, the cleaning by a fluid stream taught by Maggs is not a substrate removal process.

The Office Action provides "[i]t would have been obvious to one skilled in the art at the time the invention was made to employ the cleaning process as suggested by Maggs et al to remove debris of Boyle for the purpose of giving dependable cleaning without contaminating the substrate." (Final Office Action at page 3). However, the combination of Boyle and Maggs does not yield a fluid-handling slot formed by a first process and a second different process where the second different process removes additional substrate material from the substrate to form an upper terminus having a second profile different from a first profile and the second process also

removes debris created by the first substrate removal process as recited in claim 6. In fact, the combination of Boyle (a three step process) with the cleaning process of Maggs results in at least a four step process.

The Baughman Reference

The Office Action includes a rejection of claim 6 under 35 USC §103(a) as being unpatentable over Baughman in view of Boyle and further in view of Maggs. However, the claim limitations of claim 6 are not addressed with respect to this rejection. (See, Final Office Action at pages 4 – 6). More specifically, the Final Office Action does provide any rationale or reasoning for the rejection of claim 6 under 35 USC §103(a) as being unpatentable over Baughman in view of Boyle and further in view of Maggs.

Baughman does not cure the shortcomings of Boyle and/or Maggs. Applicant respectfully refers to column 5 starting at line 19 where Baughman describes Figures 4A-D and the etching process used. Applicant finds no discussion of a fluid-ejection device formed in a manner to reduce debris. Debris is not even mentioned by Baughman. Curiously, the Office Action provides:

> The applicants argues that Baughman fails to mention the debris. The argument is not persuasive because removing debris is an inherent step in a process of making a slot since drilling a hole on a substrate inherently produce debris. (Final Office Action at page 6).

Thus, it appears that the Office Action is relying upon inherency and not upon an explicit teaching or suggestion of Baughman. Even accepting the Office Action's premise that drilling a hole on a substrate inherently produces debris, Baughman does not teach or suggest a fluid-handling slot formed by a first process and a second different process where the second different process removes additional substrate material from the substrate to form an upper terminus having a second profile different from a first profile and the second process also removes debris created by the first substrate removal process.

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The Limitations of Claim 6 Are Not Taught or Suggested By The References

MPEP §2143.03 provides, in pertinent part:

> To establish prima facie obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. In re Royka, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). "All words in a claim must be considered in judging the patentability of that claim against the prior art." In re Wilson, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970).

With respect to the subject application, claim 6 recites a fluid-handling slot formed by a first process and a second different process where the second different process removes additional substrate material from the substrate to form an upper terminus having a second profile different from a first profile and the second process also removes debris created by the first substrate removal process. Boyle, Baughman and Maggs fail to teach or suggest this feature and thus claim 6 patentably distinguishes over the references of record.

Independent Claim 34

Claim 34 recites a substrate comprising at least a first substrate surface and a second substrate surface, a fluid-handling slot formed by at least two substrate removal processes and extending through the substrate between the first substrate surface and the second substrate surface, where the first substrate removal process comprises using a laser and the second substrate removal process comprises using abrasive particles. Claim 34 further recites a substrate surface processed by at least one of the removal processes prior to the orifice layer being positioned over the first substrate to reduce an incidence of debris occluding ink flow through individual nozzles. Hall, Boyle, Maggs and Baughman, individually and/or in combination, fail to teach, suggest or make obvious these features. Thus, claim 34 patentably distinguishes over the references of record.

Hall teaches a method for making ink feed vias. (Hall, Abstract). The ink feed vias 14 are etched through the entire thickness of the semiconductor substrate 32 and are in fluid communication with ink supplied from an ink supply container, ink cartridge or remote ink

supply. (Hall, col. 5, lines 7-9). As acknowledged in the Office Action, Hall does not teach or suggest (1) a first substrate removal process that comprises using a laser and a second substrate removal process that comprises using abrasive particles; or (2) a substrate surface processed to reduce an incidence of debris occluding ink flow through individual nozzles. (Final Office Action at pages 3-4).

As discussed above, Boyle teaches laser machining to form a via. (Boyle, Abstract). Machining may be performed in multiple passes. (Boyle, Abstract). The Office Action relies upon Figures A-B and 1-2 of Boyle. Fig. A illustrates prior art accumulation of debris and molten material at a via outlet. (Boyle, paragraph 6). Typically, the debris cannot be removed by conventional washing techniques. (Boyle, paragraph 6). Boyle does not teach a second substrate removal process that comprises directing abrasive particles.

Maggs does not cure the shortcomings of Hall and Boyle. Maggs teaches the use of a fluid stream containing abrasive particles to clean laser-machined gaps. (Maggs, Abstract). As noted previously, cleaning by a fluid stream is not a substrate removal process.

Baughman, as discussed in greater detail above describes an etching process. Baughman fails to teach or suggest a fluid-handling slot formed by a first process and a second different process where the first substrate removal process comprises using a laser and the second substrate removal process comprises using abrasive particles, and at least one of the first substrate surface and the second substrate surface being processed by at least one of the removal processes prior to the orifice layer being positioned over the first substrate to reduce an incidence of debris occluding ink flow through individual nozzles.

The Office Action provides:

> "[i]t would have been obvious to a person having skill in the art at the time the invention as made to user the laser as suggested by Boyle et al in the printhead of Hall et al to form the slot and remove the debris for the purpose of minimizing thermal damage and to achieve desires effects such as a particular via geometry." (Final Office Action at page 4).

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Applicants' representative respectfully submits that the Office Action does not provide any reference that teaches, suggests or makes obvious the limitation of claim 34 that at least one of the first substrate surface and the second substrate surface being processed by at least one of the removal processes prior to the orifice layer being positioned over the first substrate to reduce an incidence of debris occluding ink flow through individual nozzles.

Thus, Hall, Boyle, Maggs and Baughman, individually and/or in combination, fail to teach, suggest or make obvious a fluid-ejecting device comprising at least a first substrate surface and a second substrate surface, a fluid-handling slot formed by at least two substrate removal processes and extending through the substrate between the first substrate surface and the second substrate surface, where the first substrate removal process comprises using a laser and the second substrate removal process comprises using abrasive particles.

Accordingly, the §103 rejections of claim 34 are not supported by Hall, Baughman, Maggs and/or Boyle since each and every feature of claim 34 is not taught. Thus, claim 34 patentably distinguishes over the references of record and is in condition for allowance. Further, dependent claims 35-37 also patentably distinguish over the references of record and are in condition for allowance.

Independent Claim 38

Claim 38 recites a micro electro mechanical systems device comprising a substrate for supporting overlying layers; and, at least one feature formed in the substrate, the feature being formed with at least a first substrate removal process and a second different substrate removal process, wherein the second different substrate removal process also removes debris created by the first substrate removal process and wherein the first substrate removal process comprises using a laser beam and the second substrate removal process comprises directing abrasive particles toward the substrate. Hall, Boyle, Maggs and Baughman, individually and/or in combination, fail to teach, suggest or make obvious these features. Thus, claim 38 patentably distinguishes over the references of record.

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Hall teaches a method for making ink feed vias. (Hall, Abstract). The ink feed vias 14 are etched through the entire thickness of the semiconductor substrate 32 and are in fluid communication with ink supplied from an ink supply container, ink cartridge or remote ink supply. (Hall, col. 5, lines 7-9). Hall does not teach or suggest a first substrate removal process comprises using a laser beam and a second substrate removal process that comprises directing abrasive particles. Hall further does not teach or suggest the second substrate removal process also removes debris created by the first substrate removal process as recited in claim 38 of the subject application.

Boyle teaches laser machining to form a via. (Boyle, Abstract). Machining may be performed in multiple passes. (Boyle, Abstract). The Office Action relies upon Figures A-B and 1-2 of Boyle. Fig. A illustrates prior art accumulation of debris and molten material at a via outlet. (Boyle, paragraph 6). Typically, the debris cannot be removed by conventional washing techniques. (Boyle, paragraph 6). Boyle does not teach a second substrate removal process that comprises directing abrasive particles.

Maggs does not cure the shortcomings of Hall and Boyle. Maggs teaches the use of a fluid stream containing abrasive particles to clean laser-machined gaps. (Maggs, Abstract). As noted previously, cleaning by a fluid stream is not a substrate removal process.

Baughman, as discussed in greater detail above, describes an etching process. Baughman fails to teach or suggest a fluid-handling slot formed by a first process and a second different process where the first substrate removal process comprises using a laser beam and the second substrate removal process comprises directing abrasive particles toward the substrate where the second different substrate removal process also removes debris created by the first substrate removal process.

Applicants' representative respectfully submits that the Office Action does not provide any reference that teaches, suggests or makes obvious the limitation of claim 38 that the second different substrate removal process also removes debris created by the first substrate removal process.

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Thus, Hall, Boyle, Baughman and Maggs, individually and/or in combination, fail to teach, suggest or make obvious the micro electro mechanical systems device recited in claim 38. Accordingly, the section 103 rejections of claim 38 are not supported by Hall, Baughman, Maggs and Boyle since each and every feature of claim 38 is not taught. Thus, claim 38 patentably distinguishes over the references of record and is in condition for allowance.

Conclusion

For the reasons set forth above, **claims 6 and 34-38** patentably and unobviously distinguish over the references of record and are now in condition for allowance. An early allowance of all claims is earnestly solicited.

Respectfully submitted,

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